<Near Term Opportunity>
Integration Framework Document
Participant Workbook

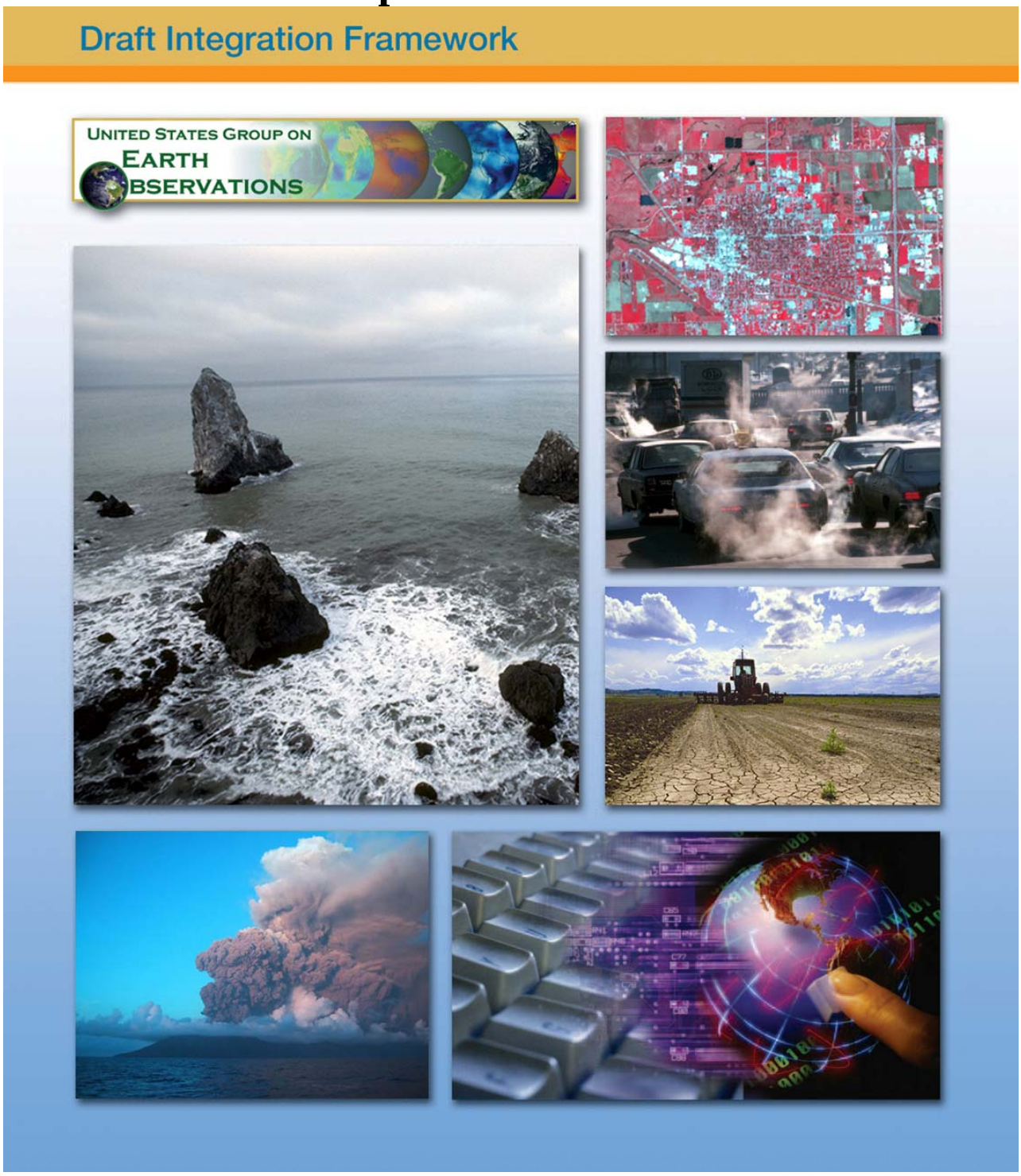


Table of Contents

Preface

A comprehensive Earth observation system can benefit people around the world by improving our ability to monitor, understand, and predict changes to the Earth. On February 16, 2005, more than 55 countries endorsed a 10-year plan to develop and implement just such a plan--the Global Earth Observation System of Systems (GEOSS) -- for the purpose of achieving comprehensive, coordinated, and sustained observations of the Earth system. The U.S. contribution to GEOSS is the Integrated Earth Observation System (IEOS). IEOS can meet U.S. needs for high-quality, global, sustained information on the state of the Earth as a basis for policy and decision making for our society. A strategic plan for IEOS has been developed by the Interagency Working Group on Earth Observations. The working group is now formally established as the U.S. Group on Earth Observation (USGEO), a standing Subcommittee reporting to the National Science and Technology Council's Committee on Environment and Natural Resources. The U.S. Strategic Plan for IEOS is organized around nine initial societal benefit areas, which provide a working framework for prioritizing actions and addressing critical gaps that maximize return on investments:

1. Improve Weather Forecasting
2. Reduce Loss of Life and Property from Disasters
3. Protect and Monitor Our Ocean Resource
4. Understand, Assess, Predict, Mitigate, and Adapt to Climate Variability and Change
5. Support Sustainable Agriculture and Forestry, and Combat Land Degradation
6. Understand the Effect of Environmental Factors on Human Health and Well-Being
7. Develop the Capacity to Make Ecological Forecasts
8. Protect and Monitor Water Resources
9. Monitor and Manage Energy Resources

The plan also calls for developing integrated Earth observation systems for six near-term opportunities: A) Data Management, B) Improved Observations for Disaster Warnings, C) Global Land Observation System, D) Sea Level Observation System, E) National Integrated Drought Information System, and F) Air Quality Assessment and Forecast System. This document is the **draft** integration framework describing the construct for these six near-term opportunities.

This framework document is organized around the Federal Enterprise Architecture Framework (FEAF) as described in section 4. The FEAF documents the complex interrelationships of business areas and processes, stakeholders, data and applications.

Table 1 - Agency Contributions

Contributing Agency	Observation System	Data	Models	Predictions/Observations	Decision Support Tools	Policy/Management Decisions
DHS						
DoD						
DOE						
DOT						
EPA						
HHS						
NASA						
NOAA						
NSF						
USDA						
NSFUSGS						

1 <Near Term Opportunity Introduction>

QUESTIONS: e.g What makes this a near-term opportunity?

What will be the benefits of integrated observation system for this opportunity?

What should be the scope of an integrated observation system?

What are the major scientific and technological challenges?

<Near Term Opportunity> supports the following societal benefits:

Table 2 - Contribution to Societal Benefit

Societal Benefit	**Contribution**
Improve weather forecasting	
Reduce loss of life and property from disasters	
Protect and monitor our ocean resource	
Understand, assess, predict, mitigate, and adapt to climate variability and change	
Support sustainable agriculture and combat land degradation	
Understand the effect of environmental factors on human health and well-being	
Develop the capacity to make ecological forecasts	
Protect and Monitor Water Resources	
Monitor and Manage Energy Resources	

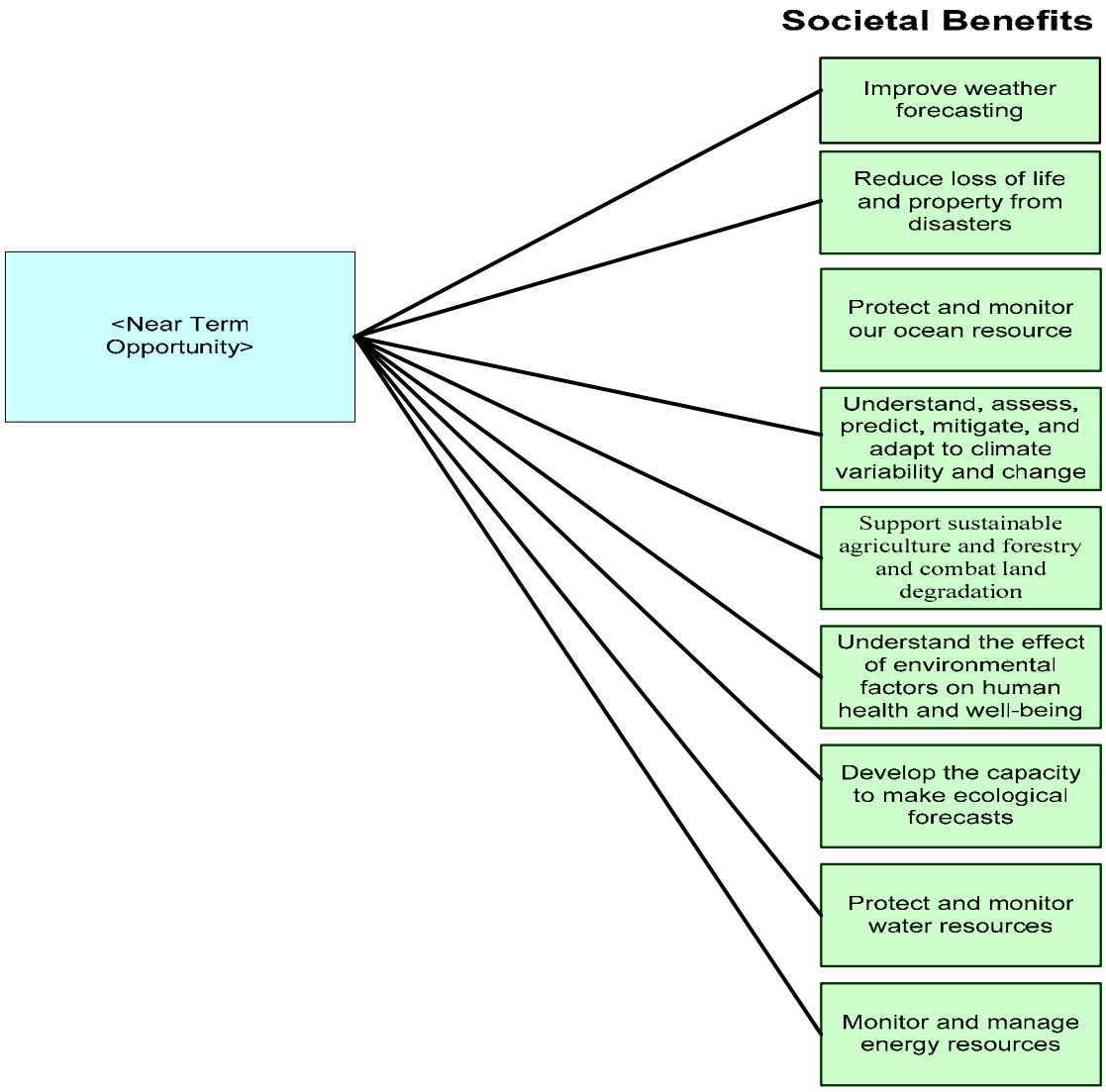


Figure 1 - Support of Societal Benefits

2. Goals and Objectives

<NTO Vision and Goals>

NEAR TERM

MID TERM

LONG TERM

3. Integrated Systems Solutions Architecture

The figure below depicts the linkage and flow of information from observations systems that provide data to earth systems models, to the predictions/observations that are derived from the output of the models or directly from the earth observations systems. The predictions and observations feed the decision support process, the output of which supports policy, management and individual citizen decisions. The output of the decision process is a critical input to the flow to optimize values and reduce gaps.[1]

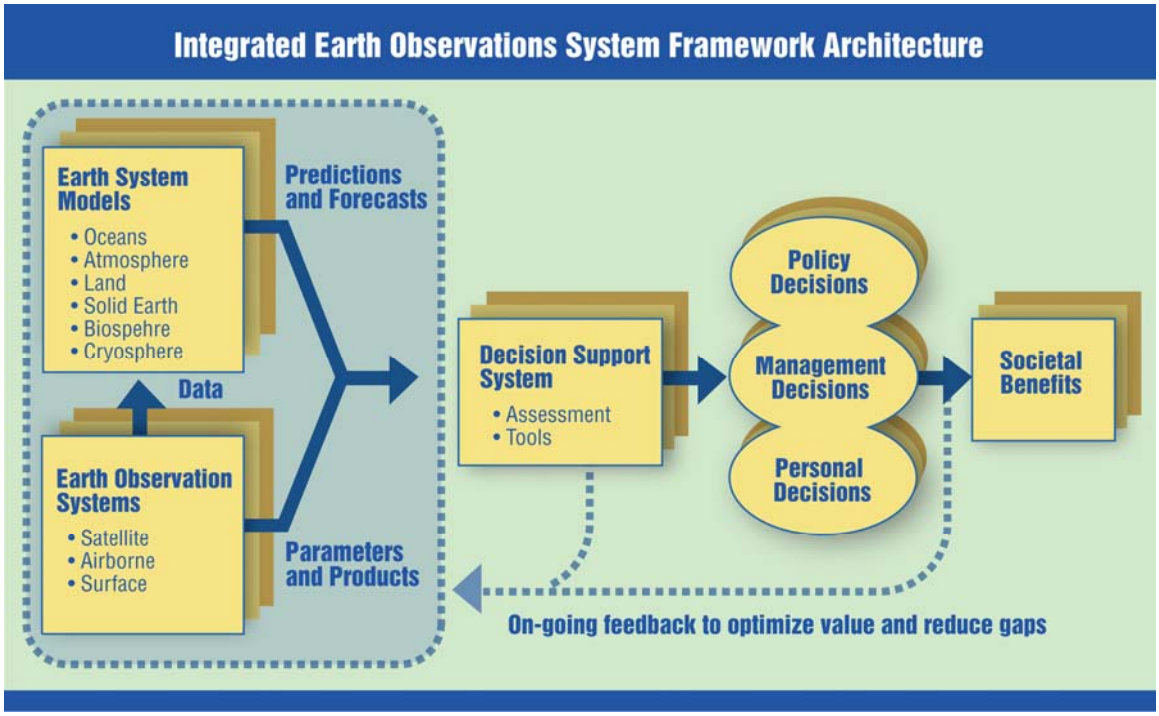


Figure 2 - Integrated Systems Solutions Architecture Diagram

[1] Draft Strategic Plan for the U.S. Integrated Earth Observation System prepared by the Interagency Working Group on Earth Observations

3.1 Products, Services, Observing Systems and Models

<NTO Summary of information, services, etc. and their sources>

The following table links the products and services provided by the contributing agencies to the observing systems, models and instruments used in collecting and producing the products and services.

Table 3.1 – Products, Services, Observing Systems, and Models

Product/Services	Observing System/ Model	Instrument/Parameter	Contributing Organizations

3.2 Decision Support Tools

The products and systems described in Table 3.1 provide the essential information that drought experts use in developing Decision Support Tools used by decision makers in responding to <NTO theme>. The following is an initial listing of the decision support tools that are applicable to <Near Term Opportunity> including a brief description of each tool and the contributing agencies.

Table 3.2 - Decision Support Tools

Decision Support Tool	Description	Contributing Organizations

4. Integration Strategy

Each of the near-term opportunities can be considered as a horizontal slice through an enterprise architecture that identifies the relevant observing systems/instruments, data, models, predictions/forecasts, decision support tools that addresses the particular near-term objective. The first step in the process of developing an architecture for a near term observing system is to establish a framework to be used to capture the legacy and plans for new observing systems/instruments, data, models, predictions/forecasts. The process for capturing, evolving, and documenting the architecture at the 2, 6, 10-year timeframe is to use the Integrated Systems Solution Architecture as a guide to the identification of the existing and anticipated capabilities.

In addition to the specific capabilities identified in Section 3, the enterprise architecture must provide the flexibility to enable organizations to 1) build and assemble models, applications and systems from legacy and/or pre-built, pre-tested services; and 2) enable applications to be interoperable, dynamically integrated and easily modified or extended through service additions or replacement. A service-oriented architecture can provide just that flexibility. A key enabler of service-oriented architecture technology is a "cyberinfrastructure". One type of contemporary cyberinfrastructure is the Enterprise Service Bus. The Enterprise Service Bus is a new variation of software infrastructure that has a range of standards-based technologies that enterprises can use as the backbone for a service oriented architecture. Enterprise Service Bus promises a true standard enterprise backbone for deploying collaborative systems, distributed solutions and a suite of services such as:

- Publish Resources
- Resource Discovery
- Resource Access
- Data Management
- Data Interchange
- Data Storage

The following sections describe the Integrated Systems Architecture process, which provides the framework methodology for capturing a near term observing system architecture for the 2/6/10-year timeframes to include the infrastructure necessary to migrate from a series of disparate capabilities to a holistic architecture.

4.1 Framework for the 2, 6, and 10-Year Target Architectures

Tables in section 3 list Earth observation systems/instruments, data products and services, models, predictions/forecasts and decision support tools that currently support or can contribute to a near term observing system. As shown in the schematic below, where applicable, the listings can be sorted on whether it is an operational or research capability and on whether it is a spaceborne, airborne or surface asset. An analysis of the contribution to the societal benefits can also be developed. The 2-year target architecture

can then be analyzed and mapped to the Federal Enterprise Architecture. Lastly, analysis of the target architecture can be conducted to identify any architectural gaps.
A detailed listing of those earth observation systems/instruments, data products and services, models, predictions/forecasts and decision support tools that currently support or will be available to support the National Integrated Drought Information System will be developed. As shown in the schematic below, where applicable, the listings will be sorted on whether it is an operational or research resource and on whether it is a spaceborne, airborne or surface asset. An analysis of the contribution to the societal benefits will also be developed. The 2-year target architecture will then be analyzed and mapped to the Federal Enterprise Architecture. Lastly, analysis of the target architecture will be conducted to identify any architectural gaps.

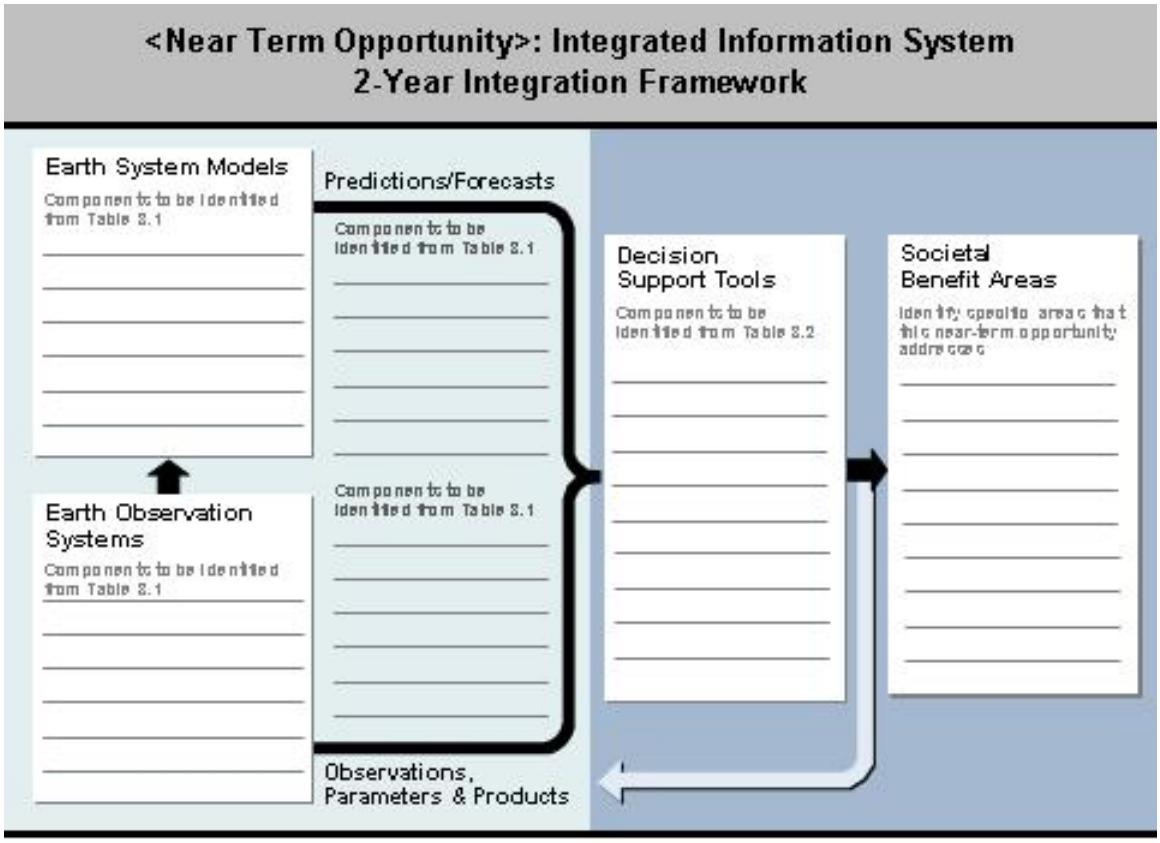
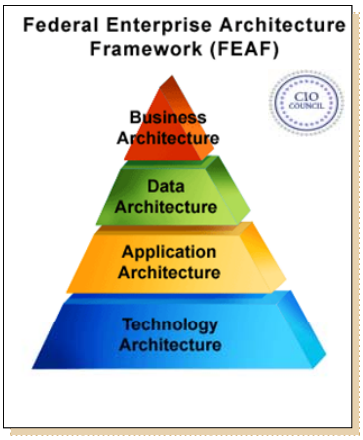


Figure 4.1 - 2-Year Target Architecture

The 6- and 10 year architectures will be the same, with the primary difference being in the process of identifying components. The process of identifying the Earth Observations System components for the 2-year target (of the IEOS) will be based on the evolution of existing inventories and plans for systems, whereas the process of identifying the Earth Observations System components for the 6-year and 10-targets (of the IEOS) will be based on the evolution of existing inventories and plans for systems.

5 <Near Term Opportunity> within the U.S. Integrated Earth Observation System

Developing a practicable Enterprise Architecture strategy for the <Near Term Opportunity> as a contributor to the U.S. Integrated Earth Observation System requires an understanding of the complex interrelationships of EOS business areas and processes, stakeholders, data, and applications. To enable understanding and ensure consistency, this section uses the Federal Enterprise Architecture Framework (FEAF) and its four Architecture layers (i.e. Business Architecture, Data Architecture, Application Architecture and Technology Architecture), which is compliant with the U. S. Federal Enterprise Architecture.



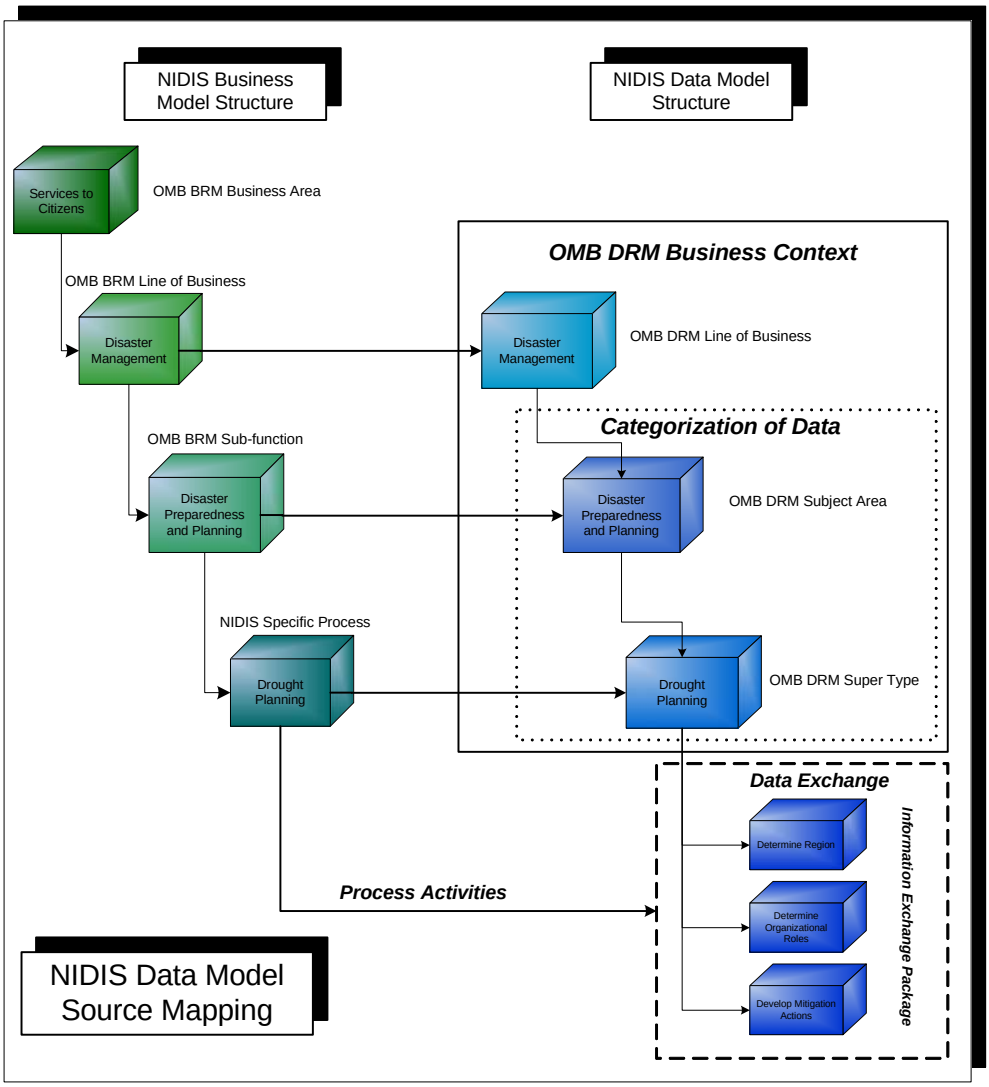
The FEA also establishes a set of five Reference Models which provide common taxonomies of entities within an Enterprise Architecture. These five Reference Models are: Business Reference Model, Performance Reference Model, Data Reference Model, Service/Component Reference Model and Technical Reference model. The following table defines the relationships between the FEAF "Architecture Layers" and the FEA Reference Models.

Table 5.1 - Mapping FEA Components

FEAF Architecture	FEA Reference Model
Business Architecture	Performance Reference Model [2] Business Reference Model[3]
Data Architecture	Data Reference Model[4] (See A.1)
Application Architecture	Service/Component Reference Model[5]
Technology Architecture	Technical Reference Model[6]

A presentation of the <Near Term Opportunity> Near-Term Opportunity, as it maps to the Data Reference Model is included in Appendix A. Mappings to the other FEAF Architectures/FEA Reference Models will be incorporated in later versions of this document.

[2] http://www.whitehouse.gov/omb/egov/a-2-prm.html
[3] http://www.whitehouse.gov/omb/egov/a-3-brm.html
[4] http://www.whitehouse.gov/omb/egov/a-5-drm.html
[5] http://www.whitehouse.gov/omb/egov/a-4-srm.html
[6] http://www.whitehouse.gov/omb/egov/a-6-trm.html



5.1 Data Architecture

The Data Architecture addresses the major types of data needed by the near-term opportunity and the relationships between those data. Data are the basis of corporate memory and are as such an essential architectural component that enables an organization's goals to be accomplished. By understanding the data architecture layer, an organization can improve data exchange and access, control redundancy, and improve data integrity.

A well-defined data architecture reflects what is happening in the Business and Application Architecture layers. Many organizations focus on managing their assets, such as staff, customers, material, and money. With a good understanding of the Earth observation system assets (e.g. data), the processes needed to manage those assets can be derived for the U.S. Integrated Earth Observing System. As a result, the Data Architecture layer also serves as a validation and verification that business processes have been identified in the Business Architecture.

The data architecture layer was developed using the Office of Management and Budget Data Reference Model (DRM) Volume I, Version 1.0. The DRM is subject to revision and the US GEO will work to ensure that the architecture strategy for the near term observing systems is modified as necessary to maintain alignment with the DRM.

This layer identifies:

- Categorization of Data
  - Data Subject Area
  - Data Super-Type
- Exchange of Data

5.1.1 Categorization of Data

The Categorization of Data is the purpose or use of the data (generally related to the Business Reference Model)

5.1.2 Data Subject Area

The Data Subject area identifies lines of business which perform activities that create and use closely related information to achieve similar outcomes.

5.1.3 Data Super Type

The Data Super Type identifies a conceptual category of data with the intent of mapping similar data groupings used by government agencies.

5.1.4 Exchange of Data

Data that is categorized around a particular business context can be exchanged in support of a business function or process.

5.1.5 Information Exchange Package

A set of data elements used to support the sharing of data within a particular business context.

Interoperability can be achieved through a structured data interchange. The DRM uses the information exchange package within the Exchange of Data as a structure to enable the exchange of data to support a business function or process.

6 List of Abbreviations

To be developed for each near term opportunity

Appendix A: Mapping to Federal Enterprise Architecture (FEA) to Data Reference Model (DRM)

A.1 FEA Data Reference Model (DRM)

See description of this model in Section 5.1. <Include only rows where mapping is relevant>

Table A.1 – Data Reference Model Mapping

Business Context			**Exchange of Data**
Line of Business	**Subject Area**	**Super Type**	**Information Exchange Package**
Disaster Management			
Environmental Management			
Income Security			
Natural Resources			

Knowledge Creation and Management			
Information and Technology Management			